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Guidelines for the Protection of Fish and Fish Habitat During Use of Glyphosate and Other Selected Forestry Herbicides in Coastal British Columbia

S. C. Samis, S. von Schuckmann, M. T. Wan,
G. D. McKellar and M. Scott

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GUIDELINES FOR THE PROTECTION OF FISH AND FISH HABITAT DURING USE OF GLYPHOSATE AND OTHER SELECTED FORESTRY HERBICIDES IN COASTAL BRITISH COLUMBIA

by

S.C. Samis[1], S. von Schuckmann[2], M.T. Wan[3], G.D. McKellar[4] and M. Scott[5]

[1] Water Quality Unit, Habitat Management Division
Department of Fisheries & Oceans
Suite 400, 555 West Hastings Street
Vancouver B.C. V6B 5G3

[2] Integrated Management Branch
B.C. Ministry of Environment, Lands & Parks
780 Blanshard Street
Victoria, B.C. V8V 4B8

[3] Conservation and Protection
Department of the Environment
224 West Esplanade
North Vancouver, B.C. V7M 3H7

[4] Council of Forest Industries of British Columbia
1200-555 Burrard Street
Vancouver, B.C. V7X 1S7

[5] Vancouver Forest Region
B.C. Ministry of Forests
4595 Canada Way
Burnaby, B.C. V5G 4L9

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ABSTRACT

Chemical vegetation control in the forest industry in British Columbia is conducted primarily by means of aerial and ground application of the herbicide glyphosate and hand application of 2,4-D in selective individual tree treatments. These guidelines provide a standardized fish and fish habitat protection strategy for use by herbicide applicators and regulatory agencies responsible for fisheries and aquatic environmental protection. The strategy is based on an established system of stream classification and the provision of a ten metre pesticide free zone around watercourses where it is deemed necessary.

RÉSUMÉ

Les applications par voie aérienne ou à partir du sol de l'herbicide glyphosate et l'application manuelle de 2,4-D pour les traitements sélectifs d'arbres sont les principaux moyens utilisés par l'industrie forestière de la Colombie-Britannique pour la lutte chimique contre la végétation nuisible. Ces lignes directrices constituent une stratégie normalisée de protection du poisson et de son habitat s'adressant aux utilisateurs d'herbicides et aux organismes de réglementation chargés de la protection des ressources halieutiques et de l'environnement aquatique. Cette stratégie repose sur un système de classification des cours d'eau établi et, au besoin, leur protection par l'imposition d'une zone riveraine exempte de pesticides de dix mètres de largeur.

PREFACE

A document entitled "Herbicide Use Supplement" was released as an adjunct to the government/industry British Columbia Coastal Fisheries Forestry Guidelines (1988) in 1991.

To effect wider distribution, the Herbicide Use Supplement is herein retitled "Guidelines for the Protection of Fish and Fish Habitat During use of Glyphosate and Other Selected Forestry Herbicides in Coastal British Columbia". Minor editing of the original text of the Herbicide Use Supplement was necessary so that it would function as a stand-alone guideline.

BACKGROUND

In British Columbia control of competing vegetation in forestry conifer plantations is accomplished using herbicides, controlled fire, manual/mechanical means and through the use of browser animals. With reference to herbicide application, the predominant broadcast use of **glyphosate** and the hand application of 2,4-D adjacent to all stream classes (see Appendix) has necessitated the preparation of these guidelines to ensure consistency in the review of provincial Pesticide Use Permit applications. For information on the fate, persistence and toxicity of glyphosate and its formulated products, the reader is directed to Servizi *et al.* (1987), Mitchell *et al.* (1987), Wan *et al.* (1989), Reynolds (1989) and Agriculture Canada (1991). For more general information on precautionary measures that are required when forestry herbicides are used Adams (1990) should be consulted.

Scope

These guidelines are intended for:

- -broadcast (ground or aerial) application of glyphosate in forestry;
- -individual stem injection treatments with any registered forestry herbicide.

These guidelines take into account both the reduced potential for off-target contamination of water during individual stem injections and the need to maintain the biophysical integrity of riparian zones for fish.

For broadcast herbicide use, **this guide is specific to glyphosate** because of the comparatively large database that exists for that herbicide and its formulated product (Roundup or Vision) under local use conditions. In summary, because more is known about the effects of glyphosate on fish compared with other registered forestry herbicides, a greater degree of confidence exists with its use adjacent to fish habitat. Notwithstanding, protection of riparian vegetation and water quality from inadvertent herbicide contamination is essential.

With reference to the application of these guidelines, determination of the procedures necessary to meet the Stream Reach Management Objectives (see Appendix) remain the responsibility of local, agency staff from B.C. Ministry of Environment, Lands & Parks and the federal Department of Fisheries & Oceans. This document is intended as a guideline only and does not supersede any other site-specific guidelines or prescriptions designed to accommodate unique local conditions and associated habitat protection requirements.

Riparian vegetation protection is stressed herein to ensure that foresters are aware of the importance of intact streamside zones to the productive capacity of fish habitat. Studies show that destruction of riparian vegetation in ephemeral and

continuously-flowing channels reduces the value of the habitat for fish. Streamside vegetation contributes five major components of fish habitat, as follows:

-Bank and channel stability (the living root network);
-Terrestrial food sources/energy input (insect drop; leaf litter);
-Cover from predators (overhanging vegetation and large organic debris);
-Temperature control (winter/summer and cumulative downstream effects);
-Sediment trapping in the channel (roots act as gravel sills).

Pesticide Use Permits

It should be noted that permits issued by the B.C. Pesticide Management Branch (PMB) for the use of pesticides on crown land may contain protection or monitoring requirements unrelated to the mandates of fishery and environmental agencies responsible for fish and fish habitat protection. The B.C. *Pesticide Control Act*, in addition to protection of water for fish, takes into account protection of human health and wildlife concerns. For example, a 10 m Pesticide Free Zone (see Appendix) may be required on a dry Class IV stream which is tributary to a stream used for a domestic water supply.

Guide to Interpreting the 10 m Pesticide Free Zone and Buffer Zones

The following provides the background for fish and fish habitat protection measures in these guidelines in relation to stream classification.

Pesticide Free Zone (PFZ)

A definition of the PFZ is presented in the Appendix. PFZs, where required, are 10 metres in width, measured horizontally from the high water mark. Observance of a 10 m PFZ is generally standard practice in B.C. when wetted channels are present. Flexibility with the 10 m PFZ exists primarily on selective individual tree treatment applications on both wetted and dry stream channels because of the greater degree of control over herbicide use that can be achieved. Treatment within 10 metres of the high water mark of Class III and IV streams is reviewed on a site-specific basis, consistent with the Statement of Principles contained in the B.C. Coastal Fisheries Forestry Guidelines (1988).

When agreement between proponents and fishery resource managers is reached on site-specific relaxation of a 10 m PFZ, the applicant is responsible for ensuring that the Pesticide Use Permit/Amendment issued by the B.C. Pesticide Management Branch authorizes the specific use pattern intended.

Buffer Zones (BZ)

A definition of the BZ is contained in the Appendix. Referral

reviews conducted by fishery agencies may include specific recommendations respecting the size of BZs. Final determination of BZ dimensions necessary to protect a 10 m PFZ or other area that requires protection is the responsibility of the applicator.

Stream Reach Management Objectives and the definition of Fishery Sensitive Zones are abstracted from the Coastal Fisheries Forestry Guidelines and are included in the Appendix herein.

Stream Class Considerations

The following tables specify requirements for the protection of fish habitat including water quality and streamside zones during forestry herbicide use. With reference to the streamside management zone concept, the Coastal Fisheries Forestry Guidelines indicate that larger leave strips may be required in the Pre-Harvest Silvicultural Prescription or larger PFZs may be stipulated in the Pesticide Use Permit for protection of streamside management zones (see Appendix for definitions and revisions to the Coastal Fisheries Forestry Guidelines).

PROTECTION REQUIREMENTS

Broadcast Applications

Table 1. Protection requirements for broadcast (ie. ground or aerial) use of glyphosate adjacent to each stream class.

BROADCAST (ground or aerial)

STREAM CONDITION	Class I	Class II	Class III	Class IV
Wet	10 m PFZ & BZ	10 m PFZ & BZ	10 m PFZ & BZ	10 m PFZ & BZ
Dry	10 m PFZ & BZ	10 m PFZ & BZ	10 m PFZ & BZ[1,2]	Overspray if no downstream concerns exist[1]

[1] Applications to treat within 10 m of the stream edge (or overspray in the case of dry Class IV streams) will be reviewed on a site-specific basis. See page 5 of these guidelines for information on data requirements.

[2] Generally, habitat protection considerations will require maintenance of intact streamside vegetation on Class III Streams. For broadcast applications, treatments should be restricted to ground, low pressure methods used with special precautions to reduce drift (eg. applicator is positioned with back to stream while spraying).

Selective Individual Tree Treatment Applications

Table 2. Protection requirements for selective individual tree treatment applications with glyphosate or other forestry herbicides. (No BZ is necessary for selective individual tree treatment.)

SELECTIVE INDIVIDUAL TREE TREATMENT

STREAM CONDITION	Class I	Class II	Class III	Class IV
Wet	10 m PFZ[3]	10 m PFZ[3]	Treatment to stream edge generally not acceptable[1,2]	Treatment to stream edge generally not acceptable[1]
Dry	10 m PFZ[3]	10 m PFZ[3]	Treatment to stream edge generally not acceptable[1,2]	Treatment to stream edge if no downstream concerns exist[1]

[1] Applications to treat within 10 m of the stream edge will be reviewed on a site-specific basis. See page 5 of these guidelines for information on data requirements.

[2] Generally habitat protection considerations will require maintenance of intact streamside vegetation on Class III Streams.

[3] Selective treatment of problem trees will only be allowed along Class I and II streams in the case of fire hazards (eg. trees growing adjacent to and under power lines) and right-of-way dangers (eg. brush along blind corners on logging roads). An onsite inspection will likely be required.

INFORMATION REQUIREMENTS

Information Requirements for Herbicide Use Within 10 Metres of Streams (not including ditches)

Provision of adequate information will facilitate office review and potentially approval of:

1) Requests to treat within the 10 m PFZ for selective individual tree treatment (see Table 2);

2) Ground, low pressure backpack spraying within the PFZ on dry Class III streams; and

3) Aerial or ground spraying adjacent to or over Class IV dry channels.

The information requirements listed below are not required in every case. The extent of data to be provided will be dependent on existing agency/industry information bases and collective experience. Seven copies of this information should be provided by proponents to the Pesticide Management Branch to accompany the Pesticide Use Permit Application.

1) Proposed treatment method and herbicide.
2) Stream class; distance to Class I/II streams.
3) Site characteristics (submit photographs where possible):

-bank depth; channel width; gradient; months of the year channel is wetted;
-composition of bank material (eg. sand, gravel, boulders etc.);
-composition of channel bed;
-bank vegetation community: List species, average height and percentage of target, non-target and non-target susceptible vegetation.
-anticipated recovery of streambank vegetation following treatment (ie. expected successional process).

Ditches

Because ditches may support spawning or rearing fish, they are classified according to the B.C. Coastal Fisheries Forestry Guidelines (1988). Although some ditches are Class I, II or III streams, the majority are Class IV. Requests to treat within 10 metres of ditches should be dealt with according to their classification.

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APPENDIX. Selected Definitions and Stream Reach Management Objectives from the Coastal Fisheries Forestry Guidelines, Glossary and Text.

Pesticide Free Zone

A strip of land, usually 10 metres in width, adjacent to a stream or waterbody and measured from the high water mark. The applicator must prevent, as far as possible and to his utmost ability, the entry of pesticides, by direct application, drift, runoff, or as a leachate, into the pesticide free zone. It is recognized that very low levels (parts per billion or trillion) are commonly found in all areas with new detection technologies. However, the pesticide free zone is to be maintained by the professional capabilities of the applicator who is qualified to make the necessary judgements regarding equipment, terrain, and weather conditions. Specific authorization is needed if the pesticide free zone is to be less than 10 metres.

Buffer Zone

A strip of land between a pesticide free zone or other area that requires protection and the treatment area. The purpose of the buffer zone is to prevent entry of residues of the applied material by drift, runoff, or leachate into the pesticide free zone or other area that requires protection. Although pesticides are not applied directly to the buffer zone, some pesticides may be deposited in the zone by drift, runoff or leaching. The width of the buffer zone necessary to maintain the pesticide free zone is up to the discretion of the applicator who must take into account the type of application, terrain and weather conditions.

Fisheries Sensitive Zones

Aquatic environments which are important for the life history of fish, including areas which may not be defined as streams. Fisheries sensitive zones may include side and flood channels, valley wall ponds, swamps, seasonally flooded depressions, lake littoral zones or spawning areas, estuaries and recreationally fished areas.

Marine sensitive zones include herring spawning areas, shellfish beds, marsh areas, juvenile salmonid rearing areas and adult salmon holding areas.

Stream Reach Management Objectives

Class I - Objective: Maintain productive capacity of fish habitats.

Class II - Objective: Minimize loss of productive capacity of fish habitats and maintain sufficient stream channel integrity to protect Class I reaches from accelereated transport of sediment or debris.

Class III - Objective: Maintain the genetic stock of indigenous species. Some permanent reduction in stock size or in-stream habitat may occur providing that necessary life processes are maintained and sufficient stream channel integrity is maintained to protect Class I and Class II reaches which may be impacted from accelerated transport of sediment or debris.

Class IV - Objective: Maintain sufficient stream channel integrity to protect Class I and Class II reaches which may be impacted from accelerated transport of sediment or debris.

Streamside Management Zones

The land, together with the vegetation it supports, immediately in contact with the stream and sufficiently close to have a major influence on the total ecological character and functional processes of the stream. The size and configuration of each streamside management zone can only be determined by site-specific analysis. On Class I and II, these would be determined using the same criteria. On Class III and Class IV reaches of significant width with potential for bank and channel erosion problems, similar criteria and zones would be required.

Protection of the Streamside Management Zone

Delineate and protect a streamside management zone (definition above) or leave strip which will provide: streambank and riparian vegetation stability; future source of large organic debris (definition below). Consider a stream management zone on each side of the stream that is equal to the channel width. For those streams that are less than 10 metres in width, a 10 metre stream management zone is suggested. For those streams greater than 30 metres in width, a 30 metre stream management zone is considered to be adequate at this time. Some selective tree removal within the stream management zone is permitted provided that a range of tree species and age classes is maintained and site disturbance is minimal. Small, low energy, seasonal, off-channel rearing areas may not require leave trees provided that the habitat is not impacted by forest harvesting activities.

Large Organic Debris (LOD)

Entire trees or large pieces which provide channel stability or which create fish habitat diversity in a stream channel.